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WOOLF, L. S. *Socialism and coopération*. (London: National Labour Press. 1911. 3s. 6d.)

*Co-partnership. Report of the London Co-partnership Congress, October, 1920.* (London: Labour Co-partnership Assoc. 1920. Pp. 33. 2s. 6d.)

### Statistics and Its Methods

*The Problem of Estimation. A Seventeenth Century Controversy and Its Bearing on Modern Statistical Questions, Especially Index Numbers.* By CORREA MOYLAN WALSH. (London: P. S. King and Son, Ltd. 1921. Pp. 144. 6s.)

The opening chapter of this book adds another link to the already lengthy chain of evidence that there is nothing new under the sun. The author shows that nearly three hundred years ago, mathematicians were already discussing the same problems which are puzzling the statisticians of today. At that time, Galileo and Nozzolini had an intricate discussion concerning the following question: "If a horse worth 100 crowns is estimated by one person at 1,000 crowns and by another at 10 crowns, which of these two estimates is the less erroneous, or are they equally erroneous?" Nozzolini contended that the estimate of 10 crowns was equally as far astray as an estimate of 190 crowns. Galileo, on the contrary, took the position that the estimates of 10 crowns and 1,000 crowns represented equal errors. Mr. Walsh points out that the controversy was really over the use of the arithmetic or geometric average. Galileo apparently had the better of the argument and established the fact that the geometric average is the correct one to use in connection with estimates. Present-day statisticians have often assumed that the average adapted to estimates is also applicable to observations. The author points out that the two things are entirely different in their nature. When numerous estimates are plotted as a frequency graph, they give a curve greatly skewed to the right, while observations yield a symmetrical curve instead. The arithmetic mean of observations approaches the correct result, but this average is highly erroneous when applied to estimates.

This discussion serves as an introduction to a searching analysis of the nature and uses of different types of averages. The principles set forth have been so carefully worked out that one needs to be well prepared indeed before he takes issue with Mr. Walsh.

The third chapter is devoted to price indices and takes up in detail questions of the applications of the various types of averages to this problem. The nature and merits of weighting are also discussed and the importance thereof is strongly emphasized. The conclusions reached, concerning the best index number for use in measuring changes in the purchasing power of money are largely in harmony with those

presented by Professor Irving Fisher at the Annual Meeting of the American Statistical Association in December, 1920.

The author does not hesitate to take to task vigorously those statisticians whose reasoning seems to him to be careless or unsound. It appears to the reviewer that at least one such criticism is ill founded. Professor Edgeworth is quoted as saying: "It is with the index numbers as with conduct; in order to form a just judgment, we must always look to the underlying idea and purpose." Mr. Walsh flatly denies the truth of this assertion and says: "In averaging price variations, the purpose or object is given; it is to measure changes in the exchange-value or purchasing power of money." The thought thus stated is adhered to throughout the book. Is it not true, however, that Professor Edgeworth is correct in his assertion and that the idea of confining index numbers of prices to one use only limits their application to much too narrow a field? Index numbers are required for the purpose of measuring construction costs, wages, average prices of consumers' goods, and hundreds of other things, and there seems no justification for overemphasizing the importance of the particular form of index best adapted to measuring changes in the general purchasing power of money, for are we sure that because that particular index best serves the last-mentioned purpose, it is also the ideal one for each of the other uses? Mr. Walsh seems to present no evidence sufficient to establish his contention in this regard.

Although a book so vigorously written is certain to clash with the views of some statisticians, there will, nevertheless, presumably be few who will not be impressed by the masterly manner in which the whole subject of price indices is handled, and who will not find the book stimulating as well as interesting.

WILLFORD I. KING.

#### NEW BOOKS

- BRENIER. *Essai d'atlas statistique de l'Indo-Chine française*. (Paris: Agence Economique, 41, Avenue de l'Opéra. 1921. 12.50 fr.)
- BROWN, W., and THOMSON, G. H. *The essentials of mental measurement*. (New York: Macmillan. 1921. Pp. x, 216. \$7.)
- DANOS, G. *L'anarchie économique et les statistiques du commerce extérieur*. (Paris: Gauthier-Villars. 1921. Pp. 88.)
- DRACHSLER, J. *Intermarriage in New York City: a statistical study of the amalgamation of European peoples*. Columbia University studies in history, economics and public law, no. 213. (New York: Longmans. 1921. \$2.25.)
- HALEY, T. S. *Infant mortality. Results of a field study in Akron, Ohio, based on births in one year*. (Washington: Children's Bureau. 1920. Pp. 118.)